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PATENT SPECIFICATION

DRAWINGS ATTACHED

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846,096

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COMPLETE SPECIFICATION

Improved Rope Tensioning Means

We, THE RELIANCE ROPE ATTACHMENT CO. LD., a British Company, of 27 Park Place, Cardiff, Glamorganshire, Wales, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to rope tensioning means. It is particularly intended for application to the guide and rubbing ropes used in mine shafts and will be described by reference to such use.

In mine shafts not exceeding about 6000 feet in depth the vertically extending guides, which are provided to locate the conveyances laterally during ascent and descent, are frequently formed by steel wire ropes of a non-twisting type, extending from top to bottom of the shaft and tensioned at a loading of about 1 ton per hundred yards, the loading applied to the various guides in a shaft being preferably different so that their natural periods of vibration differ. To obtain steadier running and to prevent collision between the conveyances as they pass one another at the middle of the wind, where the lateral movement allowed by the guide ropes is greatest, tensioned rubbing ropes are suspended between the conveyances.

The usual practice is to support the upper ends of the guide and rubbing ropes upon fixed anchorages, the ropes being tensioned by weights attached to their lower ends und located in the sump at the bottom of the shaft. With this arrangement there is a risk that the weights will become submerged in water, or will become partly supported on material collecting in the sump, thus reducing the rope tensions, and inspections to guard against this risk are not always effected with the necessary frequency and thoroughness.

To meet the above difficulty and that of providing sufficient space in the sump for the loading gear, arrangements have been employed in which the ropes are anchored at their lower ends and are tensioned by means of spiral compression springs mounted in the shaft head frame, where the gear is more easily inspected and maintained. The guide ropes must be left unobstructed to a height sufficient to allow the detaching hook between the conveyance and the winding rope capel to enter the bell on the Kinging platform in the event of an overwind.

It is an object of the present invention to provide an improved tensioning device for tensioning a rope.

According to the present invention there is provided a rope tensioning device comprising abutment means for engaging a support, means biasing a rope tensioning member away from the abutment means, and rope clamping means for receiving a rope extending past the abutment means and the tensioning member and having a thrust member making threaded engagement with the tensioning member whereby when a rope extends past the abutment means, and tensioning member to the clamping means, the tensioning member urges the thrust member and clamping means away from the abutment means under the action of the biasing means, relative rotation of the tensioning member and thrust member varying the load applied by the biasing means.

The biasing means preferably comprises a spiral compression spring, the rope passing axially through the spring to the clamping means, but instead of a spring either hydraulic or compressed air means or a combination of these may be used.

The thrust member preferably comprises an externally screw threaded tube, which surrounds the rope and applies thrust to the rope clamp, and the tensioning member comprises a nut in threaded engagement with the tube.

[*Price 3s. 6d.*]

Price 25p

Preferably the tube is held against rotation and a thrust bearing is interposed between the nut and the spring.

One preferred form of a rope tensioning device according to the invention will now be described by way of example only, reference being made to the accompanying drawings, in which:—

Figure 1 is a longitudinal sectional view of a rope tensioning device according to the invention, and

Figure 2 is a side view of the lower half of said device showing a load indicator provided on the device.

Referring to the drawings, in this particular device a horizontal base plate 1, which in use is bolted directly to the channels 2 of the Kinging platform, or other support has a central aperture, in which is secured the lower end of a vertical, open ended support tube 4. The tube 4 has collars 4*a* and 4*b* secured, as by welding, around its inner and outer ends respectively. Four radial support members 4*c* extend down the sides of the tube 4 between the collars 4a and 4*b* and are welded to the tube and to said collars. This tube receives slidably the inner, unthreaded end 5 of a tubular loading or thrust screw 6, a pair of keys 7 on the outer end of the support tube engaging in longitudinal grooves 8 in the loading screw to hold the latter against rotation. The outer portion of the loading screw is externally screw threaded and its outer end 9 is secured to a rope clamping gland 10, which is preferably of the kind sold by the applicant company under the Registered Trade Mark "Reliance." The outer threaded portion of the screw is engaged in a nut 11 which has an inner portion 12 of phosphor bronze to give ease of movement and to safeguard against corrosion and an outer ring 13 of steel to give added strength, the bronze insert being keyed and bolted by means of bolts 14 to the steel outer portion 13, which is formed with radial holes for the insertion of a tommy bar (not shown). A spiral compression spring 17 surrounding the support tube 4 and loading screw 6 bears at its inner end against the base plate 1 and at its outer end against a crown member 18 which in turn bears against the nut 11, a ball thrust bearing 19 being interposed between the crown member 18 and the nut 11. A spring loaded seal member 20 engages in corresponding annular grooves 21 and 22 formed in the steel outer portion 13 and crown member 18 respectively. The spring 17 and the parts within it are enclosed by a telescopic weather proof cover, formed by a pair of tubes 23 and 24 secured respectively to the base plate 1 and the crown member 18.

A rope R to be supported and tensioned has its end (not shown) remote from said tensioning device anchored by means of a rope clamping gland, engaged against or secured to a suitable fixed stop. The other end of the rope R passes through the aperture 3, the support tube 4 and loading screw 6 and is secured in the gland 10 at the outer end of the latter and by means of a pair of clamps 25. By rotating the nut 11, the loading screw 6 with the gland 10 can be forced outwardly in the direction of the arrow to the extent required to give the desired tension to the rope R, the nut 11 and crown member 18 being forced in the opposite direction to impart a corresponding compression to the spring 17. A projecting collar 26 at the inner end of the threaded portion of the loading screw limits outward movement of the screw through the nut and ensures that even in the fully extended position the inner end 5 of the tubular screw 6 will be retained within the support tube. The outward thrust of the spring, applied through the crown member, nut, loading screw and gland to the rope, maintains the tension in the latter substantially constant in spite of expansion and contractions due to temperature variations. A scale 27 and co-operating index mark 28 provided on the outer surfaces of the two parts 24 and 23 respectively of the telescopic housing afford an indication of the load applied to the rope. A bush 29 at the inner end of the support tube 4 seals that portion of the rope enclosed within the tube and a grease nipple (not shown) in this bush provides means for lubricating the rope enclosed within the tube.

It should be understood that when used for tensioning a wire rope acting as a guide in a mine shaft, for example, the device of the present invention be attached to the upper or lower end of the wire rope.

WHAT WE CLAIM IS:—

1. A rope tensioning device comprising abutment means for engaging a support, means biasing a rope tensioning member away from the abutment means, and rope clamping means for receiving a rope extending past the abutment means and the tensioning member and having a thrust member making threaded engagement with the tensioning member whereby when a rope extends past the abutment means, and tensioning member to the clamping means, the tensioning member urges the thrust member and clamping means away from the abutment means under the action of the biasing means, relative rotation of the tensioning member and thrust member varying the load applied by the biasing means.

2. A rope tensioning device comprising abutment means for engaging a support, resilient means urging the abutment means and a tensioning member apart and rope clamping means including a thrust member making threaded engagement with a threaded bore of the tensioning member, the thrust member having a bore through which a rope may extend from the abutment means to the clamping means, bias of the resilient means urging the tensioning member, thrust member and clamping means away from the abutment

means and relative rotation of the tensioning member and thrust member varying the loading of the resilient means.

3. A rope tensioning device according to claim 2 in which the resilient means comprise a compression spring at one end bearing against a thrust race abutting the tensioning member, and at the other end bearing against the abutment means.

4. A rope tensioning device according to any of the preceding claims in which the abutment means including a guide with which the thrust member engages, the guide and thrust member being held against relative rotation.

5. A rope tensioning device comprising an apertured abutment member for receiving a rope to be tensioned and for engaging a support, a compression spring seated on the abutment member and coaxial with the aperture, the other end of the spring seating against a thrust race abutting a rope tensioning member threaded on a bored thrust member adapted to transmit bias of the tensioning member to rope clamping means, the thrust member and clamping means being coaxial with the aperture.

6. A rope tensioning device according to any of the preceding claims in which indicating means are provided to indicate the tension applied to the rope.

7. A rope tensioning device substantially as described with reference to the accompanying drawing.

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Agents for the Applicants.

PROVISIONAL SPECIFICATION

Improved Rope Tensioning Means

We, THE RELIANCE ROPE ATTACHMENT CO. LD., a British Company, of 27 Park Place, Cardiff, Glamorganshire, Wales, do hereby declare this invention to be described in the following statement:—

This invention relates to rope tensioning means. It is particularly intended for application to the guide and rubbing ropes used in mine shafts and will be described by reference to such use.

In mine shafts not exceeding about 5000 feet in depth the vertically extending guides, which are provided to locate the conveyances laterally during ascent and descent, are frequently formed by steel wire ropes of a non-twisting type, extending from top to bottom of the shaft and tensioned at a loading of about 1 ton per hundred yards, the loading applied to the various guides in a shaft being preferably different so that their natural periods of vibration differ. To obtain steadier running and to prevent collision between the conveyances as they pass one another at the middle of the wind, where the lateral movement allowed by the guide ropes is greatest, tensioned rubbing ropes are suspended between the conveyances.

The usual practice is to support the upper ends of the guide and rubbing ropes upon fixed anchorages, the ropes being tensioned by weights attached to the lower ends and located in the sump at the bottom of the shaft. With this arrangement there is a risk that the weights will become submerged in water, or will become partly supported on material collecting in the sump, thus reducing the rope tensions, and inspections to guard against this risk are not always effected with the necessary frequency and thoroughness.

To meet the above difficulty and that of providing sufficient space in the sump for the loading gear, arrangements have been employed in which the ropes are anchored at their lower ends and are tensioned by means of spiral compression springs mounted in the shaft head frame, where the gear is more easily inspected and maintained. The guide ropes must be left unobstructed to a height sufficient to allow the detaching hook between the conveyance and the winding rope capel to enter the bell on the Kinging platform in the event of an overwind, and the known tensioning arrangements for mounting in the head frame have a rather considerable overall height.

It is an object of the present invention to provide an improved tensioning device having reduced space requirements and other advantages.

According to the present invention rope tensioning means are provided which bear at one end against a fixed support and at the other end apply thrust to a rope clamping means, said rope clamping means being so supported by said other end of said tensioning device that any rope length attached thereto will lie substantially in the direction of said fixed support from said other end.

The tensioning means preferably comprises a spiral compression spring, the rope passing axially through the spring to the clamp, but instead of a spring either hydraulic or compressed air tensioning means may be used.

When a spiral compression spring is employed, tension adjusting means are preferably interposed between the spring and the clamp and these means may comprise an externally screw threaded tube, which surrounds the rope and applies thrust to the rope clamp, and a nut in threaded engagement with the tube and bearing against the end of the spring. Preferably the tube is held against rotation and a thrust bearing is interposed between the nut and the spring. Other features and advantages of the invention will sufficiently appear from the following description of a particular form of device embodying the invention.

In this particular device a horizontal base plate, which in use is bolted directly to the channels of the Kinging platform, or other support has a central aperture, in which is secured the lower end of a vertical, open ended support tube. This tube receives slidably the lower, unthreaded end of a tubular loading screw, a pair of keys on the upper end of the support tube engaging in longitudinal grooves in the loading screw to hold the latter against rotation. The upper part of the loading screw is externally screw threaded and its upper end is secured to a rope clamping gland, which is preferably of the kind sold by the applicant company under the name "Reliance." The threaded part of the screw is engaged in a nut which has an inner portion of phosphor bronze to give ease of movement and to safeguard against corrosion and an outer ring of steel to give added strength, the bronze insert being keyed and bolted to the steel outer portion, which is formed with radial holes for the insertion of tommy bars. A spiral compression spring surrounding the support tube and loading screw bears at its lower end against the base member and at its upper end against a crown member which in turn bears against the nut, a ball thrust bearing being interposed between the crown member and the nut. The spring and the parts within it are enclosed by a telescopic weather proof cover, formed by a pair of tubes secured respectively to the base plate and the crown member, and a spring loaded seal is provided between the nut and the crown member.

The rope to be supported and tensioned has its lower end anchored by means of a rope clamping gland, engaged against or secured to a suitable fixed stop. The upper end of the rope passes upwardly through the support tube and loading screw and is secured in the gland at the upper end of the latter. By rotating the nut, the loading screw with the gland can be forced upwardly to the extent required to give the desired tension to the rope, the nut and crown member being forced downwardly to impart a corresponding compression to the spring. A projecting collar at the lower end of the threaded part of the loading screw limits upward movement of the screw through the nut and ensures that even in the fully extended position the lower end of the tubular screw will be retained within the support tube. The upward thrust of the spring, applied through the crown member, nut, loading screw and gland to the rope, maintains the tension in the latter substantially constant in spite of expansion and contractions due to temperature variations. A scale and co-operating index mark provided on the outer surfaces of the two parts of the telescopic housing afford an indication of the load applied to the rope. A bush at the bottom of the support seals that portion of the rope enclosed within the tube and a grease nipple in this bush provides means for lubricating the rope enclosed within the tube.

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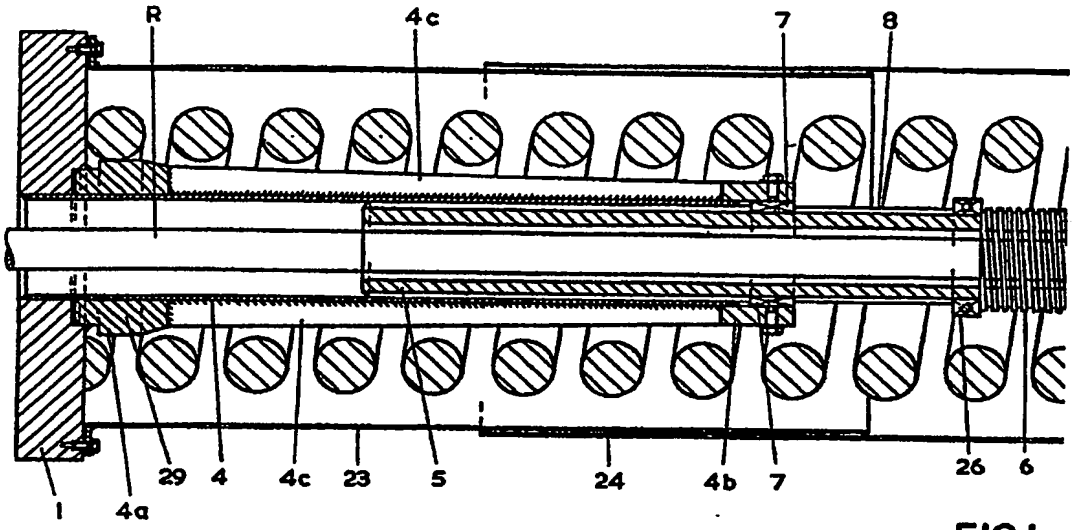
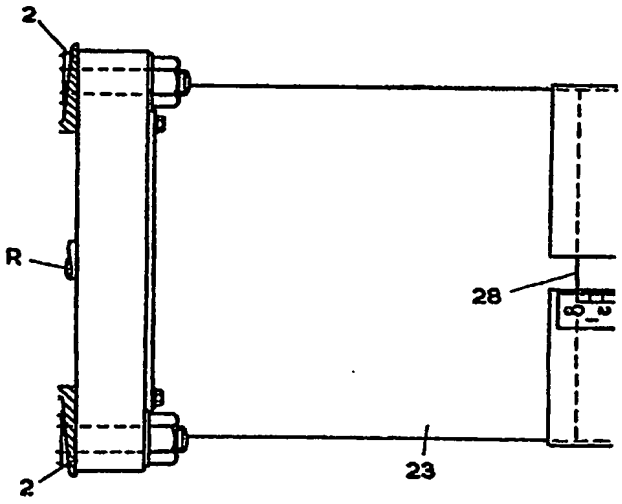


FIG.1



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1 SHEET

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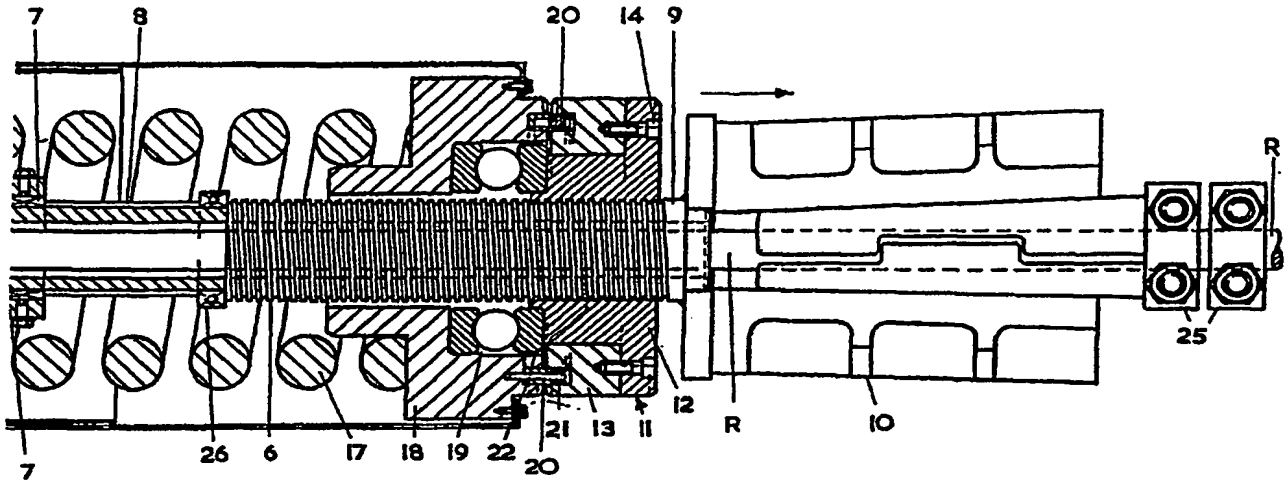

FIG.1

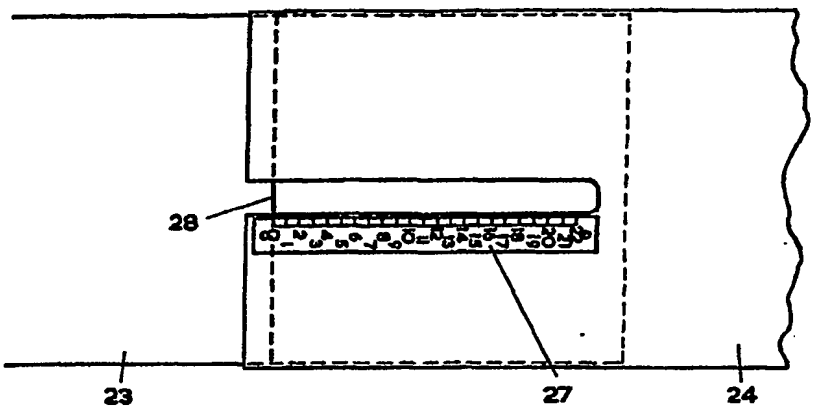

FIG.2

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale.*

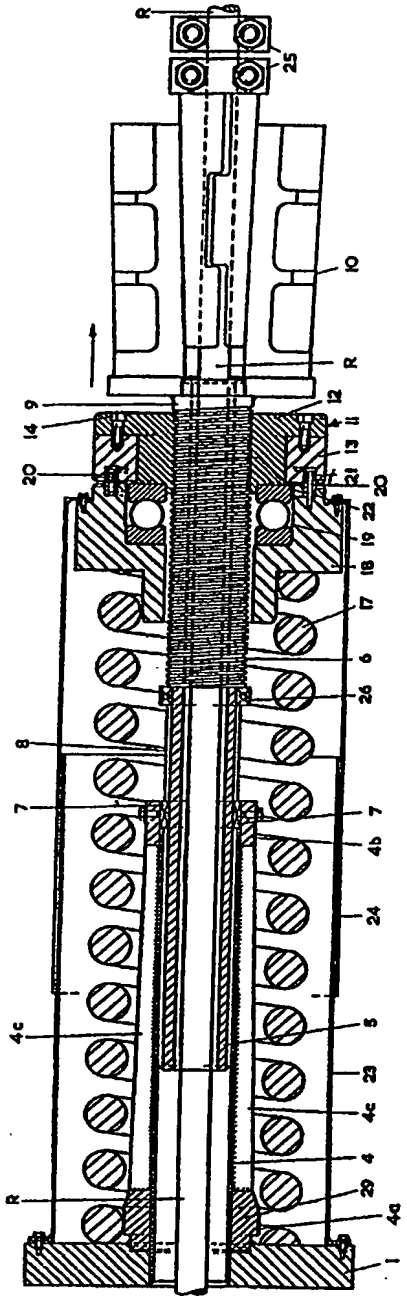

FIG.1

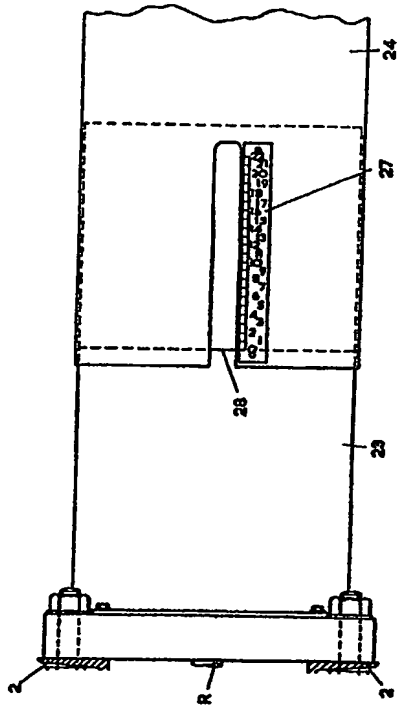

FIG.2